CCSP Synthesis and Assessment Product 5.3
Open Meeting and Writer's Workshop

Southwest Center, University of Arizona
January 10-11, 2008

Thursday, January 10, 2008

In Attendance: Helen Ingram, Nancy Beller-Simms, Kelly Redmond, Thomas Pagano, Gregg Garfin, Michael Dettinger, Nathan Mantua, Holly Hartmann, Andrew Wood, David Feldman, Anne Waple, Barbara Morehouse. On the telephone: Robert Webb.

Notes taken for Thursday by Barbara Morehouse

1. The meeting was convened at 9 a.m. The beginning of the meeting had been set aside for public comments. Since there were no public comments, we commenced with the agenda.

2. A summary of the NRC panel review was presented. The agenda for the two days was discussed.

3. Helen provided a summary of the decisions that had been proposed by a committee of the lead authors as to necessary revisions of CCSP 5.3; these were based on panel comments and the writing group's assessment of what the document needed. In summary:

- Chapter 1 is new and will contain an introduction to the report
- Chapter 2 will encompass the previous Chapter 1 plus text from the previous Chapter 3 and integration of some social aspects. This is essential for transforming the report into a more cohesive and coherent document.
- Chapter 3 will consist of the previous Chapter 2; this chapter will include material from the introduction to the prior Chapter 4.
- Chapter 4 will remain a review of case studies as "experiments"
- Chapter 5 (Conclusions) will be revised to include priorities for the future

4. A discussion ensued about who the audience for this report is intended to be. The review panel seemed to be expecting the report to speak to the Academy and to Federal program managers (with regard to how to target resources), more than to policy makers. The lead writers noted, however, that climatologists and social scientists, science managers, policy makers and other entities that might profit from the information were also seen as target audiences. Ann clarified that the CCSP reports are also intended to speak to policy makers, especially with regard to the design and language of the executive summary and chapter 1. The ensuing chapters can then be more technical.

5. Drought was not addressed in the draft report. Comparative discussion of western drought versus the recent Atlanta drought issues could be very helpful, as would text on

western vs. eastern drought. Issues related to drought will be addressed through assignments to several participating authors. Some new case studies should be added, including the Drought Outlook product. This should be included at the end of Chapter 2. This is an example of a "blended" decision support tool. This will provide a segue to the discussion of impediments to information use that will appear at the beginning of the following chapter. In addition, a discussion of city-level drought planning and its hurdles will be included in Chapter 4. Also, NIDIS provides a means to discuss communication issues, and – as an example – to clarify the concept of an early warning system as an end-to-end activity.

6. General requirements: (a) The question of whether more peer-reviewed literature needed to be cited was discussed, with the agreement that this was not necessary; academy reports, other gray literature, and case studies are legitimate sources of evidence, and are ones that the review panel endorsed. However, it would be appropriate to identify where research is still needed to provide the needed peer literature foundation; (b) All chapters need to be revised with foregrounding of the panel reviewers' comments clearly front and center; and (c) Each chapter should state an agreed upon set of key points – answering the prospectus questions - up front; all else should either be eliminated or moved to an appendix.

7. The outlines and plans for each chapter were then discussed. Below are suggestions made for each chapter.

<u>CHAPTER 1</u>

- This chapter needs to address up front what the report covers, why this report was written, what it aims to do, and why readers should care. There also needs to be text discussing what the report is not covering (infrastructure options, climate change, other water manager issues), and clarify that hard evidence from peer reviewed literature is inadequate, requiring reference to non-peer reviewed sources.

- It is also important to state up front that managers have always dealt with climate variability, but things are changing now in ways that bring into question the validity and effectiveness of past strategies.

- Chapter 1 also needs to define decision support – including social systems of communication and feedback.

- There also needs to be a couple of paragraphs discussing variability versus change, and the value of science in understanding these processes. This provides an intellectual context for later discussion of managers' dilemmas in managing water resources.

- The chapter needs to be more analytical, to highlight mismatches, issues of insufficient resources etc., and to focus more on products plus processes rather than simply a description of products. It should discuss topics such as the effect of

demographic changes and related water demand patterns, as well as negative consequences of past decisions and development actions. Also important are the implications of constraints posed by water quality issues, conjunctive water use, and groundwater use. An important point is that these issues already exist and with current and future climate variability and change, these issues are likely to grow.

- The move toward adaptive management to solve problems, rather than relying solely on engineering solutions should also be highlighted; there is an important question related to how much water managers' decisions can be addressed via information and science versus the need for more infrastructure development. This constitutes an important decision nexus for managers.

- The existing text about the importance of context was seen to be important and the figures previously labeled 2.1 and 2.2 will be included here, along with some additional discussion, in general terms about institutional changes needed.

- Problems of past reductions in water resources could be discussed here, in the context of what might be expected with climate change. This could be couched in terms of the fifty-year window used for engineering infrastructure.

- Ann will work on developing a box for the report that provides a reference to other relevant CCSP reports.

- This chapter needs, like the rest of the report, to provide evidence for statements made.

CHAPTER 2

- The issue of forecast use stimulated considerable discussion. Good forecasts can be made without considering climate; much of the forecasting skill derives from data derived from monitoring. Although seasonal forecasts can improve decision making, they are still not being used much. In part, this relates to concerns that actual conditions may turn out to be quite different from the forecast, leading to an increase in risk and negative impacts arising from forecast-based decisions. Relatedly, non-use of forecasts also traces to inadequate demonstration of cases where forecasts led to successful decisions. In essence, the issue is one of reliability. One example of forecast use, though not documented in the peer-reviewed literature, may be found in activities of the Northwest River Forecast Center, which uses information from CPC and others. Also, water managers often pay attention to medium-range forecasts, though use of the information tends to be qualitative in nature. Andrea Ray's PhD thesis documents how forecasts have been incorporated into a larger decision model.

- The process of using such information needs to be included in this chapter; this constitutes a response to comments from the review panel. Also needing to be incorporated into this chapter is discussion of where improvements could be made, for example investment in improving land surface monitoring.

- Organizational and political issues associated with forecast use should be discussed in Chapter 3, whereas misalignments with regard to rules governing forecast use should be included in Chapter 2. Also to be included in Chapter 2 is the discussion of test beds that was in Chapter 3 of the report version reviewed by the Academy. Per the Academy review, it is important to avoid assuming that improved forecasts will actually be used, however. Also important is a discussion of constraints posed by information overload; this will be included in Chapter 5.

- Regarding private sector provision of information, solid evidence needs to be provided, including examples.

- The amount of text devoted to description of products needs to be significantly reduced (though there was some argument that much of this material needs to be kept in this section). Some really good examples of products would be very helpful, for example include a deterministic product, a probabilistic one, etc. The discussion of skill should also be shortened, in favor of more text on initial conditions.

CHAPTER 3

- This chapter will incorporate: discussions of how climate variability affects water management, a description of decisions water managers typically make, and examination of how and why information is or is not used. Issues related to information reliability and trustworthiness should also be included.

- A discussion should be included about collaborative processes and their value – as well as obstacles to collaboration – and should be illustrated with case studies of boundary-spanning organizations. Examples from the RISA program should be included as a means of illustrating how barriers can be overcome. This analysis of collaborative processes needs to include discussion of problems associated with fostering collaboration, such as procedural constraints, policy barriers, and resource availability. This discussion gets at the question of whether options prescribed by science are even possible to adopt. It also opens the door to diagnosis of the problems, sources of uncertainties, and social context as a mediating force.

- It is also important to discuss how decision-support activities and products can help leverage scientific and technological advances in a way that makes such innovations useful to decision making processes.

- Further research needs will also be added.

- The above themes set the stage for the experiments included in Chapter 4 of the previous draft. It draws on literature focused on collaboration theory and public use of science as well as interdisciplinarity among scientists and translation of science through collaboration with decision makers – who often share little in common. It highlights the need to consider technical and organizational issues. It also allows discussion of participation by the general public, where information must go through yet another transformation to be usable. The message is that collaboration issues need to be overcome for science to be used. There needs to be added text that considers the issues of likely payoff versus investment required, and of priority setting: who sets what priorities. Some of this information already exists in Chapter 3 of the previous draft and can be imported.

- A discussion also arose over whether the new Chapter 3 should follow the case studies, rather than precede them. It was agreed that this cannot be done because the studies are needed to support the points being made in this chapter. It was decided that Chapter 3 will include selected case studies (including a few from Chapter 4) and vignettes to help illustrate otherwise abstract points.

- With regard to the topic of drought, the process discussion will be included in Chapter 3 (e.g., NIDIS, Drought Center) and case studies will be included in Chapter 4 (see below).

CHAPTER 4

- Drought case studies will be added to this section, specifically a discussion of the Colorado River and the ATF drought cases. The work of the Southeast Climate Consortium on drought will also be profiled.

- Two experiments related to drought will be added: the AHAP case and Australia as an international example. Others suggestions include the Brazil example (Lemos and Finan) and the Famine Early Warning System provides an African example.

CHAPTER 5

- This chapter should question assumptions about water, and address overarching concerns of equity with regard to access to and usability of water resources.

- This chapter will address future research needs and opportunities, including the need for more sophistication in science citizenship, and for more nuanced discussions of science, the value of participation in decision processes, etc. Science citizenship establishes an improved environment for decision makers; with increased privatization of water, even more citizenship capacity will be needed. A good example of poor support for science citizenship may be found in agencies' decision to exclude citizens from decisions about water management during the southeastern drought.

Friday, January 11, 2008

In Attendance: Helen Ingram, Nancy Beller-Simms, Kelly Redmond, Thomas Pagano, Gregg Garfin, Michael Dettinger, Nathan Mantua, Holly Hartmann, Andrew Wood, David Feldman, Anne Waple, Barbara Morehouse. On the telephone: Robert Webb.

Notes taken by Kathy Jacobs

The morning session was a continuation of Thursday's discussion with the following suggestions given by the authors for each chapter.

Chapters 3 and 4 – Led by Dave Feldman

- We've added case studies, and are integrating the case studies into the text. E.g.:

  ⇒ Atlanta and SE Drought, illustrating issues of complexity, conservatism and lack of coordination

  ⇒ Section 3.2.2 SW drought management case will also added. Vulnerability through climate variability

- Should policies be described that link variability and decision making? Talking about long-term variability, e.g., multi-decade drought, and issues that result from a mixture of inadequate preparation with growth. There is a disjoint between drought planning and water planning. Water planning is constrained by law but drought planning is an emergency response. There is a disjoint between information and law and policy; this is an ongoing theme. A point should be made that it is hard to find the hardwired connections between policy and climate. Generally speaking, climate variability is indirectly linked to water management and is a combination of facilities and policy.

- Each major thematic subsection will have either a case or a vignette, or in some cases both.

- 3.2.4 Reliability and trustworthiness – Yakima case is being added; it will highlight distrust and aversion to forecast use. There is also a distrust issue in the Klamath Basin. They are very averse to forecasts at the moment, in part due to bad experiences in the context of the decision framework that they have. They are also in a place without much skill. Their decision framework is not well linked to the climate situation. Recent history of conflict is the background – a big political overlay, hostility towards agency people. Andy will summarize what he knows and get it verified by NRCS.

- NIDIS underscores early warning for drought/communicating with decision makers. This case should be about one page in length. The points will be amended to fit the illustration of the case study.

- There will be a number of possible subsections on obstacles – the Colorado River compact and legal barriers to collaboration, Atlanta and SE drought, Brazil, Lake Powell (floods of early 1980's and consequences of failure to use information), Advanced Hydrological Planning System – challenge is timely accurate and specific forecasts; key lessons from the latter will be addressed by Tom.

- We will use whatever cases develop, and not use the ones that don't get done.

- The Bureau has learned a lesson on the use of climate information in EIS; it is one that shows learning. This comes up again in 4.4 (Bureau incorporating climate information is news that we need to incorporate).

- Social-political context – El Nino-La Nina Seasonal Climate Outlook forecast uncertainty, peer review section will be moved to chapter 4.

- We will be renaming chapter 4 to making decision support tools more useful, usable and responsive to needs.

- Paleoclimate, Fire, INFORM, S. Florida, NY long-term management, CALFED are examples of tools that have been used to try to meet needs. Primary issue - CALFED is environmental water account – could have used climate information, but currently not using the program.

- Issue: Academy's concern that our report is supposed to be about variability, not change. NRC called us to task because our directive was seasonal to interannual (SI). Climate change is important but we have an important story just focusing on SI.

  ⇒ Social scientists believe climate change has put variability on the map and can't be ignored. We are narrowing cases in Chapters 3 and 4, as much as possible to variability cases. Since the introduction to the report addresses mounting water problems, longer-term climate change can be addressed here. The question about variability vs. change – we are set up for variability to some degree, but not for major changes in the climate regime.

  ⇒ The most relevant time frame for policy making is longer-term change. Climate has always been changing, so the distinction between variability and change doesn't matter. Extreme conditions are a combination of the two. We are talking about a difference in kind of extremes. In the last 10 years we don't know if what we are seeing is variability or change. If we exclude consideration of a difference in regimes, that is not helpful to policy makers.

⇒ There is another Synthesis and Assessment Product on climate extremes that focus on climate change. SI is still the main way of delivering information to forecasters about variability – the distinction is not that important.

⇒ We are working to expand the discussion of forecasts beyond seasonal – e.g., paleoclimate, historical records, up to tracking global oscillations, and scenarios. Broader context for information. If climate change forces you to operate near the margins, the forecasts become more important. This should go in chapter 1.

- Knowing what the snow is on the ground in March is not as useful to us in the future. In the past, knowing the snow pack was more important than the forecast, this approach may be shifting. This is still somewhat undocumented. One of Tom's papers is on changing spring regimes and effects on forecasts.

- Need to add cases related to capacity building.

- Possible vignettes to include: CADWR, NJ state climatologist providing leadership in getting the issue to the forefront, Cooperative Extension, SE Consortium, Murray-Darling adaptive management and user knowledge, Glen Canyon adaptive management, Other vignettes: climate focal points and local weather service offices, regional climate services, National Drought Mitigation Center, AZ Water Institute: embedded associate directors.

- Should include RISAs here– they are being discussed in the beginning of chapter 4. INFORM is HRC's part in CAP. At the end it comes up again. Diagram of RISA connections – showing relationship between forecasts and RISAs – general conceptual model.

- 4.3 Measurable indicators of progress. Will still have a section on this, including references to existing SARP report.

- Seattle Public Utilities and Famine early warning system cases will be added.

- Could we also talk about forecast evaluation here? Tom could put together a paragraph. Doesn't NRCS do this in the course of doing business? Or can there be a more systematic evaluation?

- 4.4 Summary findings. Not a bad idea to add more vignettes that set the stage for future research needs. Some ideas suggested: Drought monitoring, San Pedro, Fire workshops, Aris Georgakakos's work on water modeling and drought management – functional system, balance between national production of tools and need to customize for individual users – long-term collaboration, need to do this on a number of levels. At the get-go, customization needs to be kept in mind so it is not just focused on the national level.

- Contrast with hydrologic forecasts that are done locally and at a smaller scale, something lost in the middle. Top-down vs. bottom up issues.

- Future research priorities: such a diversity of uses and users, these are related to the hydrologic diversity of the country and also the history of water management. Other questions: What is the appropriate role of the public sector vs. the private sector? Customizable tools are in part about serving the private sector. What is the point at which the federal government should stop and private industry should take over with customization?

- AMEC-Hydrosphere is a good example of customizing, private sector. Federal and state governments will never serve all the interests, but the equity issues are a concern with assuming private entities will take over.

- Governments should provide tools rather than products. This will facilitate the private sector development of products – data streams are a critical component.

- Future research needs: same message as before: vulnerability assessment, public understanding of risk, communication, etc., improving communication of uncertainty to users, need visioning exercises, evaluating effectiveness of knowledge networks, determining if the lessons of case studies are generalizable.

- We are relying on cases but if you are going to advance the theory, you need to have rigorous review. How to compel innovation, role of public and interest groups is important in forcing innovation. How will this relate to SI?

- Ideas for this chapter: Owens Valley case, Denver's efforts to manage water availability, social science research, links between agency and institutional change, use of rate structures to change behavior, and lessons from forestry, coastal, hydropower.

- Add what will climate change mean to people who are grappling with vulnerability. How will it reframe all of this? No literature on what happens to forecasts under climate change.

- Also should review the Western Governor's Climate Change Research Needs document.

- Is there a concern about adding so much material without Academy review? Reducing theory, adding references to real world problem in response to their comments – real world examples or citations of papers. Only two or three real cases being added. If what you know comes from cases, say that. We are cutting out CalFED, Delaware, Rio Grande, Yukon, and Lake Victoria.

- We should carefully frame each one of these new comments, so that it is "one key observation is". Now calling recommendations "priorities".

- The public has shown that it can take a positive role – 4.4.1 should be more of a list of findings. The research findings need to focus on tools.

- Rename the chapter 'decision support' instead of 'tools'. Chapter 3 is impediments; Chapter 4 is successes in decision support process. The list of major findings (4.4.1) should have more explicit statements about processes that have worked. The case studies that are now in 4.4.1 should be scattered between 4.1 and 4.3.

- Role attribution studies to explain why forecasts worked – are they entirely within the forecast community? This came from demands from the media for explanations; messages it generates are of interest. NOAA now discussing an attribution service. This belongs in research needs.

- Major findings – need to involve users, etc. How to establish the dialog between creators and users?

- The bullets in chapter 4 and in the previous outline are the major findings for this section.

Chapter 2 Key Findings Discussion – Led by Nate Mantua

- The use of SI climate forecasts is rare but growing. There are few operational models where the forecasts are directly used but a lot of managers are hedging their bets. Forecasts are widely consulted, but not necessarily incorporated. What does "use" mean? Cite Andrea Ray.

- NOAA NASA programs have INCREASINGLY made improved hydrologic forecasts a research priority

- For a lot of forecasts, the type of retrospective record of the forecasts for evaluation is not always available. For GFS the models change every year. The same is true for the CPC forecast system, this makes assessment difficult.

- Reliance on a variety of tools including scenarios is useful – shouldn't be developed by the forecast producers. All of them now do ensemble forecasts – those are scenarios. The common use of the word scenario- is a set of circumstances in the future; they are examples of possible future conditions. Scenarios, analogs, examples are useful for visualizing futures with stakeholders. This could be a second bullet.

- Skill actually IS important – it is necessary but not sufficient. Use Yarnal and O'Connor citation from Pennsylvania. Timeliness, relevance etc are also important

- Add need for more monitoring investment to support better decision making
- SI forecasting vs. hydrological forecasting – make distinction.
- User relevant forecast evaluations are increasing, need to talk to Pedro about this.

Conclusion of general session. The chapter authors broke into working groups to plan for revisions for their individual chapters.